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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,843	02/04/2004	LeNoir E. Zaiser	2173.2007-001	9748

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EXAMINER	
WEINSTEIN, LEONARD J	

ART UNIT	PAPER NUMBER
3746	

MAIL DATE	DELIVERY MODE
01/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/771,843	ZAISER ET AL.	
	Examiner	Art Unit	
	LEONARD J. WEINSTEIN	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3,9-24,27 and 33-58* is/are pending in the application.

4a) Of the above claim(s) *1,2,4-8 and 28-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3, 9, 10-24, 27, and 33-58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 29, 2008 has been entered.

2. The examiner acknowledges the amendments to claims 14, 24, 38, and 48.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 3, 9-11, 15-21, 27, 33-35, 39-45, and 49-58 are rejected under 35 U.S.C. 102(b) as being anticipated by Muratsubaki et al. US 6,068,448.

a. With respect to apparatus claims 15 and 49

Muratsubaki teaches all the limitations claimed for a multistage pump including: **[claim 15]** a housing (10A, 10B, 11) having a first cylindrical chamber 12A and a second cylindrical chamber 12B, the first chamber 12A having a first inlet 32 and a first outlet (34/44), the second chamber 12B having a second inlet (34/46) and a second outlet 36, the second inlet (34/46) of the second chamber 12B being in communication with the first outlet (34/44) of the first chamber 12A,

a first piston 13A positioned within the first chamber 12A to define a first piston chamber 12A, a second piston 13B positioned within the second chamber 12B to define a second piston chamber 12B the volume of the first piston chamber 12A being larger than the volume of the second piston chamber 12B (col. 9 ll. 62—col. 10 ll. 12), a connecting member (13, 14) for securing the first and second pistons (13A, 13B) together in a spaced apart manner along a common axis (as shown in figure 1), and extending between the first and second chambers (12A, 12B), the connecting member (13, 14) including a threaded screw 13, a drive system (14, 21, 22) for reciprocating the first and second pistons (13A, 13B) in unison within the first and second piston chambers (12A, 12B) such that when the first piston 13A is moving in an expansion stroke, fluid is drawn into the first piston chamber 12A through the first inlet 32, and at the same time, the second piston 13B is moving in a compression stroke where fluid is expelled from the second piston chamber 12B through the second outlet 36, and when the first piston 13A is moving in a compression stroke, the second piston 13B is moving in an expansion stroke where fluid is expelled from the first piston chamber 12A through the first outlet (34/44) and into the second piston chamber 12B through the second inlet (34/46) where the fluid is compressed due to the reduced volume of the second piston chamber 12B (col. 9 ll. 62 - col. 10 ll. 12), the drive system (14, 21, 22) including a rotatable ball screw nut 14 engaged with the threaded screw 13 and a reversible motor 21 for alternately rotating the nut 14 in opposite directions to cause reciprocating linear translation of the connecting

member (13, 14) and pistons, and a check valve system (42, 44, 46, 48) for maintaining a unidirectional flow of fluid from the first inlet 32 to the second outlet 36; **[claim 16]** a check valve system comprises a first check valve 42 in communication with the first inlet 32 for preventing fluid from exiting the first piston chamber 12A through the first inlet 32; **[claim 17]** a check valve system further comprises a second check valve 46 disposed between the first outlet (34/44) and the second inlet (34/46) for preventing fluid from exiting the second piston chamber 12B through the second inlet (34/46); **[claim 18]** a check valve system further comprises a third check valve 48 in communication with the second outlet 36 for preventing fluid from entering the second piston chamber 12B through the second outlet 36;

Further Muratsubaki teaches all the limitations claimed for a multistage pump including: **[claim 49]** a housing (10A, 10B, 11) having an input line 18 for receiving a fluid at a specified input pressure and an output line 72 for delivering the fluid at a specified output pressure higher than the specified input pressure (col. 9 ll. 62 – col. 10 ll. 12), a first piston 13A operable in an expansion stroke and a compression stroke in a first piston chamber 12A in the housing (10A, 10B, 11), the first piston chamber 12A having a first inlet 32 in fluid communication with the input line 18 and a first outlet (34/44), wherein during the expansion stroke fluid is drawn into the first piston chamber 12A through the first inlet 32 at the first specified pressure and during the compression stroke the fluid is forced out through the first outlet (34/44), a second piston 13B operable in an expansion

stroke and a compression stroke in a second piston chamber 12B in the housing (10A, 10B, 11), the second piston chamber 12B having a second inlet (34/46) in fluid communication with the first outlet (34/44) of the first piston chamber 12A and a second outlet 36 in fluid communication with the output line 72, wherein the second piston chamber 12B has a smaller volume than the first piston chamber 12A (col. 9 ll. 62 – col. 10 ll. 12), wherein during the expansion stroke fluid is drawn into the second piston chamber 12B through the second inlet (34/46) and during the compression stroke the fluid is forced out through the second outlet 36 at the second specified pressure, a first check valve 42 to prevent fluid flow from the first inlet 32 to the input line 18, a second check valve 46 to prevent fluid flow from the second inlet (34/46) to the first outlet (34/44), a third check valve 48 to prevent fluid flow from the output line 72 to the second outlet 36, a connecting member (13, 14) securing the first piston 13A and the second piston 13B together in a spaced apart manner along a common axis, as shown in figure 1, the connecting member (13, 14) having threads (as defined on element 13) along a portion of its length, a ball screw drive system (14, 21, 22) in communication with the threads (as defined on element 13) on the connecting member (13, 14) for reciprocating the connecting member (13, 14) such that when the first piston 13A is in an expansion stroke, the second piston 13B is in a compression stroke, and when the first piston 13A is in a compression stroke, the second piston 13B is in an expansion stroke; **[claim 3]** and a connecting member (13, 14) includes a threaded screw 13, the drive system (14, 21, 22) including a

reversible motor 21 engaging the threaded screw 13, via elements 14 and 22,for alternately moving the connecting member (13, 14) in opposite directions, to cause reciprocating linear translation of the connecting member (13, 14) and pistons (13A, 13B).

With respect to the limitations claimed that are in dependent form and common to independent claims 15 and 49 Muratsubaki teaches all the limitations claimed for a multistage pump including: **[claims 9 and 19]** a piston position sensing system (col. 14 ll. 4-12) coupled to the drive system (14, 21, 22) to detect when the pistons (13A, 13B) have reached a predetermined stroke and to reverse the drive system (14, 21, 22); **[claims 10 and 20]** a first pressure sensor 62 for sensing fluid pressure in the first piston chamber 12A; **[claims 11 and 21]** a second pressure sensor 64 for sensing the pressure of fluid expelled from the second piston chamber 12B; **[claims 50 and 52]** a multistage pump capable of pumping a fluid that is a gas, as Muratsubaki contemplates an accumulator that is powered by gaseous pressure from a delivery port of first pump means and thereby teaches a pumping apparatus that pumps a fluid that inherently is composed in part of a gas (col. 5 ll. 1-5); **[claims 51 and 53]** and a multistage pump capable of pumping a fluid that is a gas that includes concentrated oxygen, wherein the examiner notes that a recitation with respect to the material intended to be worked upon by a claimed apparatus does not impose any structural limitations upon the claimed apparatus which differentiates it from the prior art

apparatus satisfying the structural limitations of the claims, as is the case here. MPEP §2115.

b. With respect to method claims 39 and 54

Further Muratsubaki teaches all the limitations claimed for a method of compressing a volume of fluid: **[claim 39]** operating a first piston 13A within a first cylindrical chamber 11A defining a first piston chamber 12A in a housing (10A, 10B, 11), the first piston chamber 12A having a first inlet 32 and a first outlet (34/44), operating a second piston 13B within a second cylindrical chamber 11B defining a second piston chamber 12B in the housing (10A, 10B, 11), the volume of the first piston chamber 12A being larger than the volume of the second piston chamber 12B (col. 9 ll. 62 – col. 10 ll.12), maintaining the first and second pistons (13A, 13B) secured together in a spaced apart manner along a common axis with a connecting member (13, 14), the connecting member (13, 14) including a threaded screw (as defined by the threaded portion of element 13), reciprocating the first and second pistons (13A, 13B) in unison within the first and second piston chambers (12A, 12B) with a drive system (14, 21, 22) such that when the first piston 13A is moving in an expansion stroke, fluid is drawn into the first piston chamber 12A through the first inlet 32, and at the same time, the second piston 13B is moving in a compression stroke where fluid is expelled from the second piston chamber 12B through the second outlet 36, and when the first piston 13A is moving in a compression stroke, the second piston 13B is moving in an expansion stroke where fluid is expelled from the first piston chamber 12A

through the first outlet (34/44) and into the second piston 13B chamber 12B through the second inlet (34/46) where the fluid is compressed due to the reduced volume of the second piston chamber 12B, the drive system (14, 21, 22) including a rotatable ball screw nut 14 engaged with the threaded screw (thread portion of element 13) and a reversible motor 21 for alternately rotating the nut 14 in opposite directions to cause reciprocating linear translation of the connecting member (13, 14) and pistons (13A, 13B) – (col. 10 ll. 34-50), and maintaining a unidirectional flow of fluid from the first inlet 32 to the second outlet 36 with a check vane system (42, 44, 46, 48); **[claim 40]** the step of preventing fluid from exiting the first piston chamber 12A through the first inlet 32 with a first check vane 42 of the check valve system (42, 44, 46, 48); **[claim 41]** the step of preventing fluid from exiting the second piston chamber 12B through the second inlet (34/46) with a second check valve 46 of the check valve system (42, 44, 46, 48); **[claim 42]** and the step of preventing fluid from entering the second piston chamber 12B through the second outlet 36 with a third check valve 48 of the check vane system (42, 44, 46, 48).

Further Muratsubaki teaches all the limitations claimed for a method of compressing a volume of fluid including: **[claim 54]** the steps of receiving a fluid at a specified input pressure into a housing (10A, 10B, 11) through an input line 18 and delivering the fluid at a specified output pressure higher than the specified input pressure through an output line 72 (col. 9 ll. 62 – col. 10 ll. 12), operating a first piston 13A in an expansion stroke and a compression stroke in a first piston

chamber 12A in the housing (10A, 10B, 11), the first piston chamber 12A having a first inlet 32 in fluid communication with the input line 18 and a first outlet (34/44), wherein during the expansion stroke fluid is drawn into the first piston chamber 12A through the first inlet 32 at the first specified pressure and during the compression stroke the fluid is forced out through the first outlet (34/44), operating a second piston 13B in an expansion stroke and a compression stroke in a second piston chamber 12B in the housing (10A, 10B, 11), the second piston chamber 12B having a second inlet (34/46) in fluid communication with the first outlet (34/44) of the first piston chamber 12A and a second outlet 36 in fluid communication with the output line 72, wherein the second piston chamber 12B has a smaller volume than the first piston chamber 12A, wherein during the expansion stroke fluid is drawn into the second piston chamber 12B through the second inlet (34/46) and during the compression stroke the fluid is forced out through the second outlet 36 at the second specified pressure (col. 9 ll. 62 – col. 10 ll. 12), preventing fluid flow from the first inlet 32 to the input line using a first check valve 42, preventing fluid flow from the second inlet (34/46) to the first outlet (34/44) using a second check valve 46, preventing fluid flow from the output line 72 to the second outlet 36 using a third check valve 48, securing the first piston 13A and the second piston 13B together with a connecting member (13, 14) in a spaced apart manner along a common axis, the connecting member (13, 14) having threads (as defined by the threaded portion of element 13) along a portion of its length, operating a ball screw drive system (14, 21, 22) in

communication with the threads (as defined by the threaded portion of element 13) on the connecting member (13, 14) to reciprocate the connecting member (13, 14) such that when the first piston 13A is in an expansion stroke, the second piston 13B is in a compression stroke, and when the first piston 13A is in a compression stroke, the second piston 13B is in an expansion stroke; **[claim 27]** and the step wherein the connecting member (13, 14) includes a threaded screw (as defined by the threaded portion of element 13), the drive system (14, 21, 22) including a reversible motor 21 engaging the threaded screw (threaded portion of element 13), the method further comprising alternately rotating the connecting member (13, 14) in opposite directions with the reversible motor 21 to cause reciprocating linear translation of the connecting member (13, 14) and pistons (col. 10 ll. 34-50).

With respect to the limitations claimed that are in dependent form and common to independent method claims 39 and 54 Muratsubaki teaches all the limitations claimed for a method of compressing a fluid including: **[claims 33 and 43]** the step of sensing piston position with a piston position sensing system (col. 14 ll. 4-12); **[claim 34 and 44]** the step of sensing fluid pressure in the first piston chamber 12A with a first pressure sensor 62; **[claim 35 and 45]** and the step of sensing pressure of fluid expelled from the second piston chamber 12B with a second pressure sensor 64; **[claims 55 and 57]** the step of the method wherein a fluid is moved by the multistage pump is capable of being a gas, as Muratsubaki contemplates an accumulator that is powered by gaseous pressure

from a delivery port of first pump means and thereby teaches a pumping apparatus that pumps a fluid that inherently is composed in part of a gas (col. 5 ll. 1-5); **[claims 56 and 58]** the step of the method wherein the fluid that is moved by a multistage pump is capable of being a gas that includes concentrated oxygen, wherein the examiner notes that a recitation with respect to the material intended to be worked upon by a claimed apparatus does not impose any structural limitations upon the claimed apparatus which differentiates it from the prior art apparatus satisfying the structural limitations of the claims, as is the case here. MPEP §2115.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 12-13, 22-23, 36-37, and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muratsubaki et al. US 6,068,448. Muratsubaki discloses the

general conditions of the claimed invention except for the express disclosure of an apparatus for accomplishing a method of compressing fluid including: **[claims 12, 22, 36, and 46]** a ratio of the volume of a first piston chamber to the volume of a second piston chamber is about 12.5 to 1.0; **[claims 13, 23, 37, and 47]** and first and second pistons have a stroke of about 6 inches. It would have been obvious to one having ordinary skill in the art at the time the invention was made to alter the ratio between first and second pumping chambers to be in the range of 12.5 to 1 and a piston stroke being about six inches, since the claimed values are merely an optimum or workable range. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

8. Claims 14, 24, 38, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muratsubaki et al. US 6,068,448. Muratsubaki discloses the claimed invention except for the limitation of **[claims 14, 24, 38, and 48]** a pump being capable of pumping about 0.5 in.3 of gas at about 2200 psi per piston cycle. The volume of a discharged portion of fluid from a pump and the pressure at which it is discharged is a results effective variable with the results being 0.5 in.3 of gas at about 2200 psi per piston cycle. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a pump that was capable of pumping 0.5 in.3 of gas at about 2200 psi per piston cycle, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

9. Applicant's arguments with respect to claims 3, 9, 10-24, 27, and 33-58 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEONARD J. WEINSTEIN whose telephone number is (571)272-9961. The examiner can normally be reached on Monday - Thursday 7:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art Unit 3746

/Leonard J Weinstein/
Examiner, Art Unit 3746